BUCKS COUNTY BRIDGE 313
(Letchworth Avenue Bridge)
Spanning the Delaware Canal at Letchworth Avenue
Yardley
Bucks County
Pennsylvania

HAER No. PA-193

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD
National Park Service
Northeast Region
Philadelphia Support Office
U.S. Custom House
200 Chestnut Street
Philadelphia, PA 19106

HAER
PA
9-YARD,
7-

HISTORIC AMERICAN ENGINEERING RECORD

BUCKS COUNTY BRIDGE 313
(Letchworth Avenue Bridge)

HAER No. PA-193

Location: Spanning the Delaware Canal at Letchworth Avenue
Yardley
Bucks County, Pennsylvania

UTM: 18.514360.4454030
Quad: Trenton-West, NJ, 1:24,000

Date of Construction: 1875

Present Owner: County of Bucks
Doylestown, Pennsylvania

Present Use: Vehicular and pedestrian bridge.

Significance: Bucks County Bridge 313 is a single span Pratt pony truss crossing over the Delaware Canal. The bridge is temporally associated with the Delaware Canal, a resource currently listed on the National Register of Historic Places. The canal has also been designated a National Historic Landmark. The Delaware Canal played an important role in the economic development of eastern Pennsylvania in general and the anthracite coal fields of the Lehigh River Valley in particular.

Project Information: This documentation was undertaken by the County of Bucks in accordance with a request from the Bureau for Historic Preservation at the Pennsylvania Historical and Museum Commission. The recordation serves as a mitigation measure prior to the replacement of the bridge. The construction of this project will be completed using a combination of state and county monies, there is no federal funding in the project.

Documentation Prepared By: Jeffrey L.Amerine
Amerine Environmental & Design Associates
Phoenixville, Pennsylvania
Environmental Consultant to Bucks County.

Bridge History

During the last half of the 19th Century, the Borough of Yardley, then known as Yardleyville, was a growing community along the banks of the Delaware Canal and River. Most of the initial residential and commercial development took place along Main Street and several smaller streets between Main Street and the canal. Little development had taken place within the area between the canal and river. The first crossing of the canal in Yardleyville was at the location of the present Afton Avenue (PA Route 332) bridge, approximately 0.5 mile upstream of Letchworth Avenue. Afton Avenue was a main access road leading to a bridge which spanned the Delaware River to Greensburg, New Jersey.

By the 1870's the ground between the canal and river began to develop as residential property. A number of residential streets were laid out paralleling the canal. To provide easier access to Main Street, the Bucks County Commissioners determined that a second bridge would be constructed over the canal. The site of this bridge would be at Letchworth Avenue. This road was named for the Letchworth family, owners of a large tract of land abutting the roadway.

The commissioners of Bucks County advertised for proposals for the construction of the Letchworth Avenue bridge on December 22, 1874. The advertisement read as follows:

> Notice to Contractors.
> The Commissioners of Bucks Caunty (*sic*) will receive sealed proposals for building a bridge of the class styled Cowin's fifty-eight feet span between the abutments, in Yardleyville, Lower Makefield township, over the Canal where Letchworth avenue crosses it, until twelve o'clock, noon, on the NINE-TENTH of FIRST MONTH, 1875, at which time the bids will be open and contract awarded. Plans and specifications to be seen at the Commissioners' office, until the day above.
>
> BENJAMIN WIGGINS,
> ABRAHAM THOMPSON,
> CHARLES YOST,
> December 22, 1874 - 5t County Commissioners.

On January 19, 1875 the commissioners open the proposals. A total of 11 bids were received. The bids ranged from a low of $1,383 to a high of $3,750. The low bidder for the project was Joseph G.Preston.

Editors Note: The contracts for most truss bridges awarded by the Bucks County Commissioners during this period were bid with two separate items: the steel superstructure as one item and the masonry substructure as the other item. For the Letchworth Avenue bridge, the contract appears to have been a single, all inclusive contract.

There is no entry in the commissioners's minutes which positively identifies the supplier of the structural steel used on this bridge. However, the advertisement announcing the proposed construction states the bridge will be of the..."*class styled Cowin's*". During this time period, a foundry located in Lambertville, New Jersey operated by William Cowin produced iron and steel for a number of highway bridges in New Jersey. Lambertville is located on the east side of the Delaware River approximately 11 miles upstream from Yardley. This foundry was, most likely, the closest supplier of structural steel to the project area. It is assumed therefore, that the steel used for the construction of the Letchworth Avenue bridge was supplied by Cowin's foundry.

Bridge Description

Bucks County Bridge 313 carries Letchworth Avenue over the Delaware Canal in Yardley Borough. The bridge is located between Main Street and River Road (PA Route 32). It is currently used by both vehicles and pedestrians.

The bridge is a single span Pratt style pony truss measuring 59'6" between the centerline of the abutments. The trusses are comprised of two center panels, each 15' in width, and half-hip end panels. The truss members extend to a height of approximately 80" above the level of the deck. Total lateral clearance between the truss members is 21'6". Clear roadway width on the bridge is 20'6". The end posts are laced on both top and bottom. The top chord is covered with a solid plate on the top and laced on the bottom. The vertical columns are reinforced with lacing. All lacing and lattice is comprised of bar stock measuring 1-1/2" x 1/4" x 14-1/2". The vertical columns are supported by outriggers which extend 38" outside the columns.

The diagonals are composed of both 1" x 1-1/2" and 1" x 2" bar stock, and 3/4" dia. rod stock. All diagonals have loop welded end connections. The rod diagonals, which are connected between the bottom chord at the end vertical columns and the top chord at mid span, contain turnbuckles for tension adjustment. Subsequent to initial construction, additional diagonal members were added to increase load carrying capacity. These new members are composed of 1/4" x 2" bar stock and are connected at the same locations as the rod diagonals. Steel plates have been welded on both the inside and outside of the top chord at mid span and at the bottom chord at the bottom of the end vertical columns. The added diagonals are welded to these plates at each location.

The bottom chord is composed of 3/4" x 2" bar stock with drop forged end connections. At the same time the additional diagonal members were added, the same 1/4" x 2" bar stock was added along the bottom chord on the center panels. Steel plates, similar to those on the bottom

of the end columns were welded to the bottom of the vertical column at mid-span. The bar stock was welded to these plates on both the outside and inside of the bottom chord. No reinforcement was added to bottom chord on the end panels.

The traveling surface is composed of an open grid steel deck. The deck is 2-1/2" thick and has 2-1/2" x 2-1/2" openings. The deck is tack welded to the stringers. There are two 2-1/4" x 7" "C" channel steel railings on the bridge, one is at deck level that serves as a wheel guard and the other is at a height of 37". These are welded to the vertical columns and end posts. A 4" dia. natural gas main is attached to the top of the outriggers on the downstream side of the bridge.

The vertical clearance over the canal tow path is approximately 9'5". The distance from the bottom of the stringers to normal canal water level is approximately 11'4".

The abutments and wing walls are made of red sandstone laid up in a semi-coursed rubble pattern. The abutments are approximately 28'6" in width. The lateral clearance between the wing walls on the southern approach is 25'6" at the end of the bridge. The wing walls on this approach are approximately 22' in length. The walls, which vary in height above the roadway from 38" to 45" are 18" thick and have 20" wide by 4" thick concrete caps. The wing walls on this approach flair to provide a clearance of 26'9" between the walls. The walls on the south approach extend to a height of 15' above the existing ground line.

On the northern approach, the clearance between the wing walls is 24'10" at the bridge. The wing walls on this approach, which are approximately 62' in length, flair to 26'. The walls are 36" to 44" above the roadway level. The walls on this approach extend to a height of 19' above the existing ground line. Located on the northwest wall is a 24" x 21" stone plaque. The plaque reads:

COUNTY BRIDGE
1875
No. 313
Abraham Thompson
Charles B. Yost Commissioners
Samuel Keller

Jos.C.Preston Contractor

The Pratt Truss

The Pratt truss was originally patented by Thomas and Caleb Pratt in 1844. In their original form the trusses were constructed as composite structures using a combination of wood and cast iron members. In their final configuration, the trusses were constructed as all metal bridges. The Pratt Truss was the first scientifically designed truss bridge in America.

The Pratt truss was accepted only reluctantly by railroad engineers when it was first introduced in the mid-19th century. However, by the 1870's the truss design had gained national favor. Later, in modified and improved form, the Pratt Truss became the standard all-steel bridge for America's highways and railroads.

The Delaware Canal

Construction on the Delaware Canal, formally known as the Delaware Division of the Pennsylvania Canal, was started in 1827. The canal extended along the west bank of the Delaware River from Bristol to Easton, a distance of approximately 60 miles.

The first section of the canal to open was between Bristol and New Hope, a distance of 25 miles. Commercial traffic on this section began in 1830. Construction on the entire canal was completed in 1832. The canal interfaced with the Lehigh Canal at Easton and served as a connection between that canal and the Philadelphia area. Its primary purpose was the transportation of coal from the coal fields in Pennsylvania's anthracite region. The barges on the canal would move coal downstream to Philadelphia and return upstream with consumer goods.

The canal continued to operate until the last boat traversed it in October of 1931.

During the 19th century approximately 1250 miles of canals traversed much of Pennsylvania. Today, the Delaware Canal is one of the most intact of the many canals which operated during the 130 year canal period. It currently retains water throughout much of its length. The canal and most of its right-of-way has been incorporated into Delaware Canal State Park.

Most of the 110 bridges which crossed the canal were constructed by the canal company. The structure at Letchworth Avenue however, was constructed by the County of Bucks.

Joseph G.Preston - Bridge Contractor

The contractor for this bridge was Joseph G.Preston. Preston, by himself or in partnership with others, constructed a number of bridges in Bucks County in the latter quarter of the 19th Century.

During the 1870's, Joseph G.Preston participated in the construction of the following bridges:

Bridge	Cost
Hillpots Covered Bridge (1872 - with Walton and McCarty)	$3,589
Houpts Covered Bridge (1872 - with Walton and McCarty)	3,395
Chapman's Ford Bridge (1874 - with James Flack)	9,333
Dersteins Bridge (1875 - with Swope)	1,953
Jast Mill Dam Bridge Substructure (1888)	930
Ross Mill Bridge Substructure (1890)	1,919

Joseph Preston also submitted bids on at least 20 other bridge replacement projects in Bucks County during the last three decades of the 19th Century. He entered these proposals both by himself or in partnership with other contractors such as Jesse Black and J.L. Manfort. Submitting under the name of Preston & Kellerman, he also bid on the construction of a new courthouse in Bucks County. Other county work completed by Joseph Preston included the construction of the stable and carriage house at the county jail in 1885 for $1,533, and a dry well at the jail for $273.

Prior to the time that his name appears in the county commissioner's minutes as bidding on construction projects, Joseph Preston's name appears in December of 1871 when he was elected as County Mercantile Appraiser for the year 1872. He failed to win reelection the following year. In another entry in the minutes during December 1885, Preston..."was appointed to look after and bury any indigent soldiers from Solebury Township".

Joseph G.Preston was born in Plumstead Township, Bucks County in 1832. He was the son of Nathan and Martha, and was descended from Albert W.Preston, one of the earliest of the English settlers in William Penn's Colony. For most of his life he pursued agricultural interests. In the various census records of the latter 19th century, Preston's occupation was listed as a farmer. However, he seems to have had numerous occupations. In the Bucks County Directory of 1898, Preston was listed as an auctioneer. For twenty years he was Solebury Township's tax collector and constable. Preston was active in local and county politics, representing his district in congressional and state conventions. At one time he was the nominee of the Republican Party for a seat in the state legislature.

Mr.Preston was a member of the Society of Friends (Quaker), the faith of his ancestors. Joseph G.Preston died in 1901.

William Cowin - Foundry Owner

William Cowin was born in England in 1825 to William, Sr. and Sarah Cowen (*Editor's Note*: Following immigration to the United States during the 1830's, the spelling of the last name changed from Cowen to Cowin). The family settled in New Jersey near Lambertville.

The 1850 United States Census listed William, Sr. as a molder in a foundry in Lambertville. William, Jr. was listed as a foundry pattern maker in the census. By 1860, William, Jr. became the owner of the foundry and machine shop. The primary business of the shop was the fabrication of railroad coal cars. The foundry employed 40 men. The 1870 census records William, Jr. as the owner of a foundry in Lambertville which now employed 80 men. Foundry records from that period note that the business made railroad car wheels and other castings. There was no mention of any bridge fabrication. However, documentary research has identified at least two other bridges that were fabricated in the Cowin shop. Both of these bridges are single span Pratt pony trusses constructed in the 1870's. They are situated in Hunterdon County, New Jersey, the county in which Lambertville is located. The bridges: New Hampton Pony Pratt Truss and Glen Gardner Pony Pratt Truss, were listed on the National Register of Historic Places in the mid-1970's.

William Cowin had several other businesses in the Lambertville area. One was the Lambertville Paper Manufacturing Company (established - 1870) and the Amwell Mills Company (established - 1866), a cotton mill. By the 1880's, William Cowin has disappeared from the records of the Lambertville area.

BIBLIOGRAPHY

Bucks County Orphans Court Office, Doylestown, Pennsylvania, County Bridge 313 (various files).

Combined Atlas Map of Bucks County, J.D.Scott, 1876.

Commonwealth of Pennsylvania. Pennsylvania Historical and Museum Commission, Pennsylvania Department of Transportation. 1986. *HISTORIC HIGHWAY BRIDGES IN PENNSYLVANIA*.

Darnell, Victor C., *A DIRECTORY OF AMERICAN BRIDGE BUILDING COMPANIES 1840 - 1900*, Washington, D.C., Society for Industrial Archeology, 1984.

Davis, Gwen. Solebury Township. Personal contact.

Davis, William W.H., *HISTORY OF BUCKS COUNTY PENNSYLVANIA*, Pipersville, A.E.Lear, Inc., Publishers.

Glen Garden Pony Pratt Truss Bridge, Hunterdon County, New Jersey, National Register of Historic Places nomination, 1974.

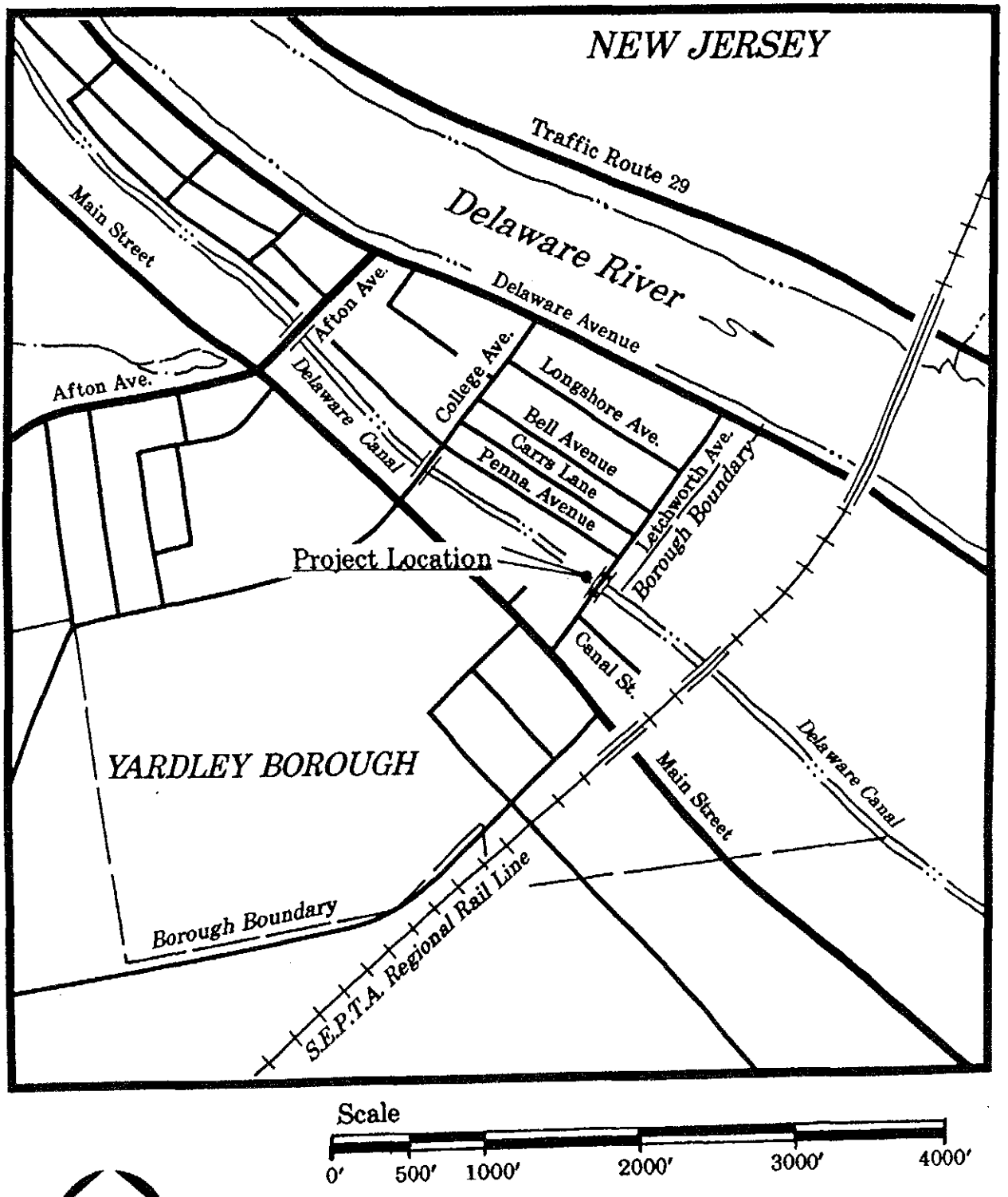
Minutes of the County Commissioners - 1870 through 1900, Doylestown, Bucks County Administration Building.

New Hampton Pony Pratt Truss Bridge, Hunterdon County, New Jersey, National Register of Historic Places nomination, 1977.

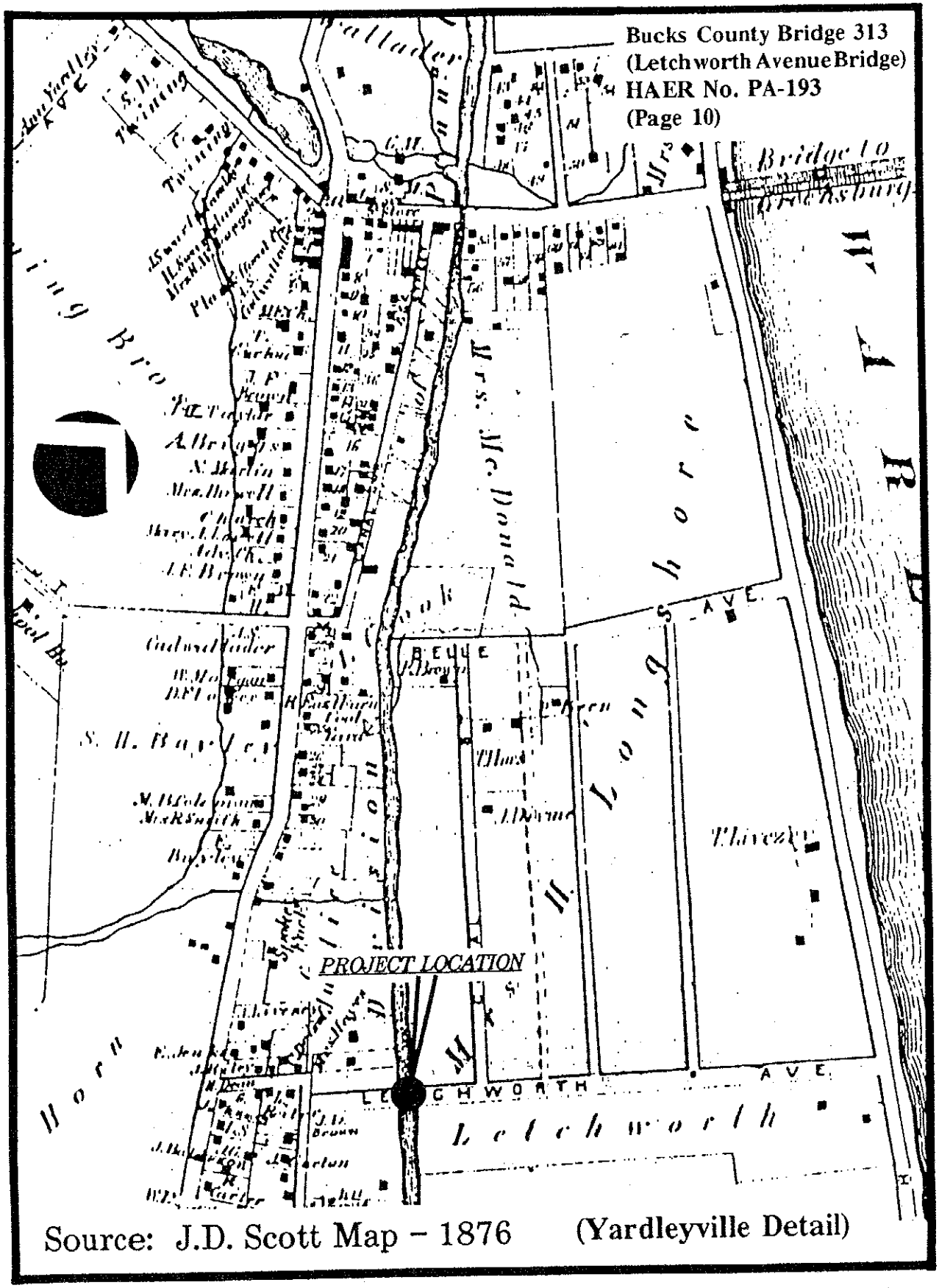
Shank, William H., *THE AMAZING PENNSYLVANIA CANALS*, York, American Canal & Transportation Center, 1981.

Thomas, Lorenzo, *THOMAS' BUCKS COUNTY DIRECTORY*, 1884.

United States Census, 1870 - 1880 - 1900.

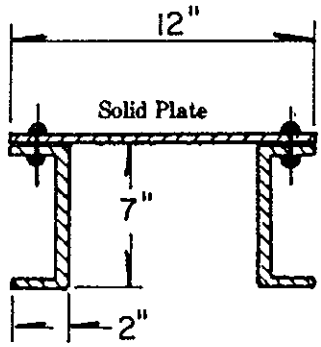


PROJECT LOCATION MAP

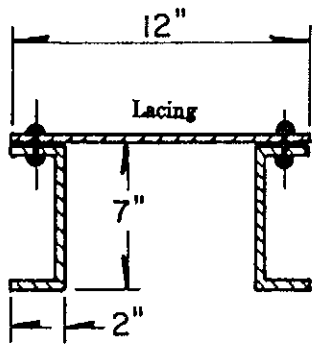

Bucks County Bridge 313
(Letchworth Avenue Bridge)
HAER No. PA-193
(Page 10)
PROJECT LOCATION
Source: J.D. Scott Map – 1876
(Yardleyville Detail)

DIMENSIONS OF STRUCTURAL MEMBERS

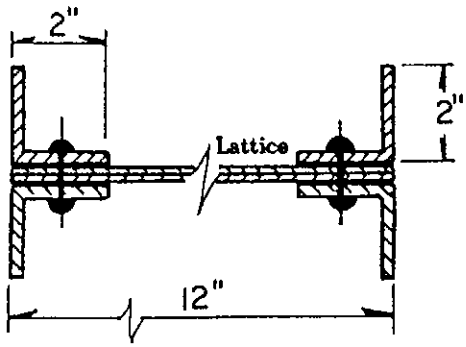
Bucks County Bridge 313
(Letchworth Avenue Bridge)
HAER No. PA-193
(Page 11)



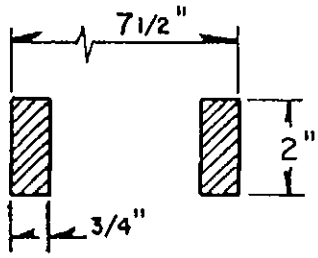
TOP CHORD



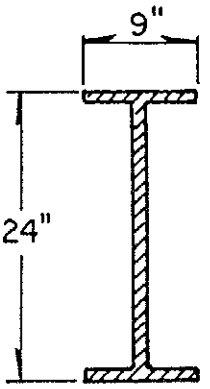
END POST



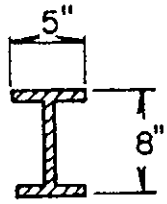
VERTICAL COLUMN



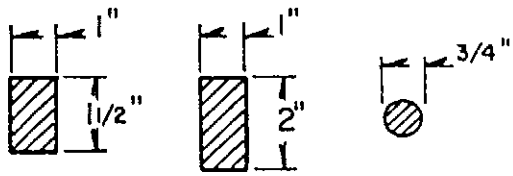
BOTTON CHORD



FLOOR BEAM
(Total of 3)



STRINGER
(Total of 15)



DIAGONALS

PIN CONNECTION

NOT TO SCALE

ADDENDUM TO:
BUCKS COUNTY BRIDGE NO. 313
(Letchworth Avenue Bridge)
Spanning Delaware Canal at Letchworth Avenue
Yardley
Bucks County
Pennsylvania

HAER PA-193
PA,9-YARD,7-

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD
PHILADELPHIA SUPPORT OFFICE
National Park Service
U.S. Department of the Interior
U.S. Custom House, 3rd Floor
200 Chestnut Street
Philadelphia, PA 19106

HISTORIC AMERICAN ENGINEERING RECORD

ADDENDUM TO
BUCKS COUNTY BRIDGE 313
(Letchworth Avenue Bridge)

HAER No. PA-193

This is a correction to an 11-page report previously transmitted to the Library of Congress in 2000.

Information provided by Mary E. McCahon, Senior Historian, Lichtenstein Consulting Engineers, 2004.

The original HAER report mistakenly dates Bucks County Bridge 313 to 1875, despite the fact that the bridge as it currently stands has an 1875 substructure and a ca. 1895 superstructure. The bridge as it currently stands does NOT date to 1875. The substructure of the bridge does indeed date to 1875 (as evidenced by the plaque in the parapet), but the superstructure probably dates to ca. 1895 since it is a steel, standardized bridge design.

William Cowin, who is attributed by the original compiler of the report as the designer and fabricator of the bridge, was active in Lambertville, New Jersey from about 1850 through 1874, when he died. Many of the bridges associated with him and his foundry have cast iron end posts, upper chords, and verticals. Others, like the one built by his Lambertville Iron Works for Delaware Township, New Jersey in 1878, have wrought iron Phoenix column compression members purchased from the Phoenix Iron Company. From available information, it seems that Cowin and Lambertville Iron Works bridges represent the early days of metal truss bridges, not the era of standardized design and built-up members that dominated after about 1885. In fact, neither Cowin and Lambertville Iron Works nor anyone else other than leading railroad bridge engineers were working in or even thinking about using steel in a metal truss bridge in 1875. Therefore, Cowin and Lambertville Iron Works may have been fabricators of the original 1875 bridge, but the later superstructure was probably the product of the Pennsylvania firm Nelson & Buchanan who frequently built pin-connected, Pratt truss bridges with standardized built-up verticals and upper chords and the distinctive and non-standard, mid-floorbeam placement of the lower panel point connectors. Research indicates they were active in the state from the late 1880s until about 1905.